An Essay
On
The Blood.

Submitted to the Faculty of the Homœopathic Medical College of Penn'a in candidacy for the Degree of Doctor of Medicine.

Session 1865–6

By

D. L. Dreibelbis M. D.

The subject we have chosen as a basis for our discussion, on this occasion, demands in all its relations our profound and most deliberate consideration. It is indeed a subject so extensive, that should we examine it minutely in all its details, time would fail us under present circumstances, to make the investigation. Before proceeding any farther, or entering fully upon our treatise, we would kindly ask permission to remark, as an introductory allusion to what we may hereafter, that we shall not undertake to record anything new on these pages, as far as regards the labor performed by our own experiments, nor shall we deem it available, or in any way necessary to make mention of all what authors entertain as

their opinion concerning this subject. Neither shall we lose time and space in quoting and propounding theories which have been formerly promulgated, and as such believed to be as true as facts themselves by many, but which when after the true and careful investigations had revealed the irrefutable facts, proved often erroneous and many even an entire falsity. Notwithstanding theories are not frequently coincident in every respect with facts before ascertained, yet have they often opened the way and we may say contributed to their successful explorations. We may even also look forward, and depict to our imagination a period in the future hoped not to be far distant, when facts shall stand instead of theories to fill

that exist, and things that are now entirely beyond our comprehension, and are obscure respecting the knowledge we possess of them at present, will be brought to full light. Such changes we will see appearing, when fruitful observations and experiments have accomplished the great thing of basing Physiology upon the Homœopathic Materia Medica, as intimated by worthy members of the Faculty. In this Thesis we claim no originality of our own, but that of language, and brevity perhaps is its only commendations it merits. Still

In the first place, we might naturally inquire, and ask this question and that with some reasonableness, what is the Blood? We say, ask this question, because after having examined

all the parts of the Blood with the different elements composing them we find that the Blood is not pure by a homogeneous fluid of a florid red or brownish red hue according to its character whether arterial or venous but that it is a compound substance consisting of many different elements. But before describing the various components of the Blood we shall endeavor to answer the proposed question by only viewing it in its simplest form, or in other words regarding the Blood as a whole without distinction to parts. Taking it in this sense we will try to answer the question in the following style, hoping thereby to cover the whole ground by this most common explanation.

The Blood is that fluid which circulates through all the vessels of our bodies in tubes or vessels provided for that purpose, called leading from the heart, arteries, and when returning the Blood to the heart, veins, with also an innumerable set of very minute vessels called, capillaries. These vessels especially the last named, are so minutely distributed throughout the whole body, in every nook and corner, so that we cannot introduce even the smallest point of a needle without drawing blood. This fluid supplies the growth and waste of the body and in this respect is the support of the same, hence some physiologists have given it the name of the Nutritive fluid. Let us remark here that

condition that every part of the food must be prepared and the body. But we must have to understand that the Blood is watery food in a concentrated form prepared by the processes of Digestion and Assimilation, not to be described under this heading. The Blood also furnishes the body with all the materials and elements necessary for the sustenance and continuance of life, and hence has been denominated the vital fluid. But the Blood possesses besides this, other special properties, which gave rise to this name, which in time further on we shall consider hereafter. We see that different names have been applied to this liquid, but all is denoting the same thing, — the Blood.

The Blood not only carries along with it all the materials which are adapted to the building up of the tissues of the body but takes up such substances that have become effete, and set free by the disintegration of the tissues in order that they might be eliminated from the system by the skin and the organs of respiration and secretion.

When we observe the Blood with the unassisted eyes, we see it as a homogeneous mass of a scarlet or crimson color as the case may be. This is the case at least in Man and the higher order of Animals. But as we descent in the scale of organized beings and come to the lower groups of the Animal Kingdom, we at once perceive a marked difference in the appearance and also in the composition of this fluid.

In the lowest animals, such as the polyps and medusa the nutritive fluid is in the form of chyme mingled with water in the cavity of the viscera and in this state it comes in immediate contact with the whole of the interior of the body. In the jellyfishes which constitute a somewhat higher rank, we still have the same fluid but the cavity of the viscera is prolonged into different parts of the body and currents are produced partly by the movement of the animal, and partly by microscopic cilia, called vibratile cilia, which overspread the interior, and have an incessant vibratory motion. In most of the Mollusks and Articulates the circulating fluid consists of chyle and serum mixed with water in Mollusks it comes also in immediate contact with the viscera

and is distributed to every part of
the body by the heart. We
have before remarked that
the color of the Blood is a bright red color, and
would further state that this is true
in all Vertebrata with perhaps the ex-
ception of one animal the Amphioxus.
We have also seen that in some Inver-
brata the nutritive fluid is called
Chyme or Chyle, or perhaps it would not
be by appearance, being as it is nearly
quite colorless. But this is by no means
the case in all Invertebrata in regard
to the color of the fluid but we
find it colored various; in the
and some chirodems; from blood
orange, red violet lilac and green.
When Blood is drawn from a vessel of

the body and then expand to the air undisturbed for a little while perceive a remarkable change takes place in this order; the coloured parts of the Blood sinks to the bottom of the vessel wherein this Blood is contained and there remains on top a nearly colorless fluid which is called the Serum. If we now pour off the Serum we have remaining in the bottom of the vessel a clot called the Crassamentum. By taking a stick and stirring this clot for a minute or two we perceive little fibrous strings attaching themselves to the stick; this is the Fibrine of the Blood By washing the clot we may obtain the same result. If we examine the clot more closely with the Microscope we observe it to consist of a fibrous interlace

ment or network the interspaces beng filled up with Blood corpuscles. If we take the serum & expose it to a moderate degree of heat it will coagulate, and by this we determine the presence of Albumen in Blood. If we keep on raising the temperature higher, until all the animal matter is decomposed, there will still be left, some earthy and alkaline salts. Thus the Blood is seen to be composed of these four principal constituents, viz— Fibrine Albumen, Corpuscles & Saline matter.

By examining the Blood Microscopically as it is circulating through a thin membrane, for instance that of a frog's foot or a rabbits ear, we observe a transparent fluid, the liquor sanguinis, and in this fluid float

in a very globular and somewhat
compressed body, the Blood Corpuscles
Blood corpuscles called among the
Red somewhat a rather colorless Co
puscles differing widely from the
in size, shape and number. We will
devote our attention first to the Red
Corpuscles. The shape of the Red Co
puscles differs greatly in different
kinds of animals, being oval in
all Oviparous Vertebrata, while in
Man and most of the Mammalia
they are cells of a flattened form or
a distinctly circular outline. In hu
man Blood the discs are biconcave
that is they are a little depressed at
their sides and in their centre is seen
a bright spot supposed by some
to indicate the existence of a nucleus
But this idea has been rejected, and

by changing the form of the Blood Corpuscles
so as to render it more readily absorbed
or passed through the walls of the vessels
upon the principal of capillary attraction. Some have contended that
the color of the Blood was due
to the form of the Red Corpuscles and
their consequent power of reflecting
light. Let it be granted that this does
some influence upon the Blood in
regard to its color, we are nevertheless
inclined to think that those writers
entirely overestimate the value of this
property. The Blood Corpuscles may
be seen to change their form very readily
by the addition of some liquid
which if of less density than the cell
contents within, is made to pass into
the cell through its thin walls which
are permeable to fluids, by the law of

Endosmose, one of greater speed, the cells contents are made to pass out by the law of Exosmose. During the course of these changes or that of Endosmose, the Blood Corpuscles will be seen to change their concave form into that of a flat and then later double-convex, when the central spot is seen to disappear, while still later they become so distended that they assume the spherical form, and finally the wall bursts; while in the later of that of Exosmose it contracts, shrinks, and has a corrugated appearance. The Blood Corpuscles may so frequently observed to change their forms while circulating through the body, without the application of such agents just mentioned. This phenomenon is generally due to their passage through the more minute capillaries,

which are even smaller in diameter than the Blood cells themselves, and hence it follows that they often have a dilated & bent appearance.

The next thing that engages our attention, is the cell contents of the R. Corpuscle. These are found to be formed principally of two compounds, Globulin and Hematin. To the latter of these substances some writers maintain that the color of the Blood is due, altogether. As to the composition of the cell walls authors have not yet fully determined. Prof. Lehman, as mentioned by Carpenter gives the following comparison between the Chemical constitution of the Red Corpuscles and that of the Liquor Sanguinis. In 1000 parts he puts down, Water 688.0, Solid residue 312.00 as the contents of the Red Corpuscles,

while that of the Liquor Sanguinis, Wa
ter 902.90 Solid residue 97.10 showing the
predominance of Solids in the latter.
The mineral substances of the Blood
which we will but briefly notice before
passing by are Chlorine, Sulphuric acid,
Phosphoric acid, Potassium, Sodium,
Oxygen, Phosphate of Lime and Phos
phate of Magnesia. These form 8.12
parts of the 312.00 of the Solid residue of
the Red Corpuscles and 8.55 of the 97.10
of that of the Liquor Sanguinis, or in
other words so many parts in 1000.
There are also found in the Blood Fat
and Extractive Matters, forming about
5.285 in 1000 parts. The term Extractive
includes all those substances in the
Blood, which form so small a quan
tity, that their definite proportions
have not yet been ascertained.

According to Lecamu and H.C. Sorby and Garrod, the average proportion of each of the organic elements in 100 parts of healthy Blood, is as follows, Water 790.00 Corpuscles 127.00 Solid matter of the Serum 80.00, Fibrin 3.00.

We remarked already above, that the White or Colorless Corpuscles differ from the Red in many respects. In number of these is quite small, especially in Man and the higher Vertebrata, when compared to the Red, being no more than 2.55 in 1000, as estimated Moleschott. Kölliker also confirms this statement as being correct, or as near as can be ascertained. In the other Vertebrata, and especially those commonly called, cold blooded animals, the proportion of white Corpuscles

a much greater being as observed by Wagner, Vierordt as high as 1 to 6 in the blood of a frog. These estimates have been made from healthy Blood. In the proportion which the colorless corpuscles bear to the Red, varies very much in diseased states of the system being greatly increased in number, in Splenic leukæmia subjects and such individuals that are suffering under diseases of internal organs such as the spleen, Liver, and lymphatic glands. This has been termed Leucocythæmia (white cell blood).

The Colorless Corpuscles are generally smaller than the Red when compared in size. This is especially the case in the lower Vertebrata, in which this fact has first been observed. In Man and other Mammalia this

comparative rapidity to be 6 degrees; the White being nearly the same with the Red. There is to be noticed a remarkable peculiarity in the White Corpuscles in that they have a slow motion like the Red. The same reference to their uniform constancy in size of the different classes of Vertebrata being seldom greater or less than 1-4000 of an inch in diameter in the warm blooded Vertebrata and 1-2500 of an inch in Reptiles. In the circulating the Colorless Corpuscles occupy the axis of the vessel, or as by some called, the lymph spaces, and their movement is quite slow in contradistinction to that of the Red, which move along very rapidly through the centre of the vessel.

Considering the development of Blood

Corpuscles both Red and White, Cannot be used as evidence that they are originally developed from the hyaline globule, in some mode or the other, but that these two forms are distinct and complete, each one in itself neither being capable of undergoing metamorphosis into the other.

It is supposed that the Blood Corpuscles, both Red and White, have a definite term of Life or existence, the same as other cells, and that there is all the time going on a destruction of the old ones, while at the same moment new ones are in a state of formation or development.

The Blood Corpuscles are also the carriers of Oxygen and Carbonic acid in which respect they perform a most important part of office. The charged

the Blood Corpuscles undergo in the process of Oxygenation, and also the change of the Blood and its color in general, we have no time to consider. In a Pathological point of view the Blood is seen to undergo great changes in disease, but this we have also to pass over. Much more might be said on those points already discussed, and there are others, which we only mentioned in our foregoing remarks that require a great deal of attention and which are of great importance to know; but on account of time (which at this season is indeed very variable) we have to cut short our remarks, with the hope that this Essay may meet with your kind approbation.